CLAIMS

1. Tyre for vehicle wheels comprising:
   - a carcass structure shaped in a substantially toroidal configuration, the opposite lateral edges of which are associated with respective right-hand and left-hand bead wires to form respective beads;
   - a belt structure applied in a radially external position with respect to said carcass structure;
   - a tread band radially superimposed on said belt structure;
   - at least one layer of crosslinked elastomeric material applied in a radially internal position with respect to said tread band;
   - a pair of sidewalls applied laterally on opposite sides with respect to said carcass structure;

   wherein said at least one layer of crosslinked elastomeric material has the following characteristics:
   - a dynamic elastic modulus (E'), measured at 70°C, not lower than 20 MPa;
   - a ratio between tensile modulus at 100% elongation (M100) and tensile modulus at 10% elongation (M10) not lower than 1.5.

2. Tyre for vehicle wheels according to claim 1, wherein said at least one layer of crosslinked elastomeric material has a dynamic elastic modulus (E'), measured at 70°C, of from 25 MPa to 50 MPa.

3. Tyre for vehicle wheels according to claim 1 or 2, wherein said at least one layer of crosslinked elastomeric material has a ratio between tensile modulus at 100% elongation (M100) and tensile modulus at 10% elongation (M10) of from 2 to 5.

4. Tyre for vehicle wheels according to any one of the

preceding claims, wherein said at least one layer of crosslinked elastomeric material has a dynamic elastic modulus (E'), measured at 23°C, not lower than 30 MPa.

5. Tyre for vehicle wheels according to claim 4, wherein said at least one layer of crosslinked elastomeric material has a dynamic elastic modulus (E'), measured at 23°C, of from 35 MPa to 70 MPa.

6. Tyre for vehicle wheels according to any one of the preceding claims, wherein said at least one layer of crosslinked elastomeric material has a percentage variation of tensile modulus at 10% elongation (M10), measured in a direction substantially parallel to the equatorial plane of the tyre, with respect to tensile modulus at 10% elongation (M10), measured in a direction substantially perpendicular to the equatorial plane of the tyre, not higher than 20%.

7. Tyre for vehicle wheels according to claim 6, wherein said at least one layer of crosslinked elastomeric material has a percentage variation of tensile modulus at 10% elongation (M10), measured in a direction substantially parallel to the equatorial plane of the tyre, with respect to tensile modulus at 10% elongation (M10), measured in a direction substantially perpendicular to the equatorial plane of the tyre, not higher than 15%.

8. Tyre for vehicle wheels according to claim 7, wherein said at least one layer of crosslinked elastomeric material has a percentage variation of tensile modulus at 10% elongation (M10), measured in a direction substantially parallel to the equatorial plane of the tyre, with respect to tensile modulus at 10% elongation (M10), measured in a direction substantially perpendicular to the equatorial plane of the tyre, not higher than 5%.

9. Tyre for vehicle wheels according to any one of the preceding claims, wherein said at least one layer of crosslinked elastomeric material has a thickness lower than 2 mm.

10. Tyre for vehicle wheels according to claim 9, wherein said at least one layer of crosslinked elastomeric material has a thickness of from 0.5 mm to 1.5 mm.

11. Tyre for vehicle wheels according to any one of the preceding claims, wherein said at least one layer of crosslinked elastomeric material is placed between said tread band and said belt structure.

12. Tyre for vehicle wheels according to any one of claims 1-10, wherein said at least one layer of crosslinked elastomeric material is placed between said belt structure and said carcass structure.

13. Tyre for vehicle wheels according to any one of the preceding claims, wherein said at least one layer of crosslinked elastomeric material is formed by a plurality of coils of a continuous elongated element.

14. Tyre for vehicle wheels according to any one of the preceding claims, wherein said elastomeric material comprises:

(a) at least one diene elastomeric polymer;

(b) at least one layered inorganic material having an individual layer thickness of from 0.01 nm to 30 nm.

15. Tyre for vehicle wheels according to claim 14, wherein the layered inorganic material (b) has an individual layer thickness of from 0.05 nm to 15 nm.

16. Tyre for vehicle wheels according to claim 15, wherein the layered inorganic material (b) has an individual layer thickness of from 0.1 nm to 2 nm.

17. Tyre for vehicle wheels according to any one of

claims 14 to 16, wherein the layered inorganic material (b) is present in the elastomeric material in an amount of from 1 phr to 120 phr.

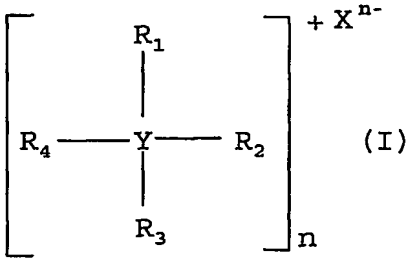
18. Tyre for vehicle wheels according to claim 17 wherein the layered inorganic material (b) is present in the elastomeric material in an amount of from 5 phr to 80 phr.

19. Tyre for vehicle wheels according to any one of claims 14 to 18, wherein the layered inorganic material (b) is selected from phyllosilicates such as: smectites, such as, montmorillonite, nontronite, beidellite, volkonskoite, hectorite, saponite, sauconite; vermiculite; halloisite; sericite; or mixtures thereof.

20. Tyre for vehicle wheels according to claim 19, wherein the layered inorganic material (b) is montmorillonite.

21. Tyre for vehicle wheels according to any one of claims 14 to 20, wherein the layered inorganic material (b) is treated with a compatibilizer.

22. Tyre for vehicle wheels according to claim 21, wherein the compatibilizer is selected from the quaternary ammonium or phosphonium salts having general formula (I):



(I)

wherein:

- Y represents N or P;
- R_1, R_2, R_3 and R_4, which may be identical or different, represent a linear or branched C_1-C_{20} alkyl or hydroxyalkyl group; a linear or branched C_1-C_{20} alkenyl or hydroxyalkenyl

group; a group $-R_5-SH$ or $-R_5-NH$ wherein R_5 represents a linear or branched C_1-C_{20} alkylene group; a C_6-C_{18} aryl group; a C_7-C_{20} arylalkyl or alkylaryl group; a C_5-C_{18} cycloalkyl group, said cycloalkyl group possibly containing hetero atom such as oxygen, nitrogen or sulphur;

- X^{n-} represents an anion such as the chlorine ion, the sulphate ion or the phosphate ion;
- n represents 1, 2 or 3.

23. Tyre for vehicle wheels according to any one of the preceding claims, wherein the diene elastomeric polymer (a) has a glass transition temperature below 20°C.

24. Tyre for vehicle wheels according to claim 23, wherein the diene elastomeric polymer (a) is selected from: natural or synthetic cis-1,4-polyisoprene, 3,4-polyisoprene, polybutadiene, optionally halogenated isoprene/isobutene copolymers, 1,3-butadiene/acrylonitrile copolymers, styrene/1,3-butadiene copolymers, styrene/isoprene/1,3-butadiene copolymers, styrene/1,3-butadiene/acrylonitrile copolymers, or mixtures thereof.

25. Tyre for vehicle wheels according to any one of claim 14 to 24, wherein the elastomeric material comprises at least 10% by weight with respect to the total weight of the at least one diene elastomeric polymer (a) of natural rubber.

26. Tyre for vehicle wheels according to claim 25, wherein the elastomeric material comprises between 20% by weight and 100% by weight with respect to the total weight of the at least one diene elastomeric polymer (a) of natural rubber.

27. Tyre for vehicle wheels according to any one of claims 14 to 26, wherein the elastomeric material further comprises at least one elastomeric polymer

of one or more monoolefins with an olefinic comonomer or derivatives thereof (a').

28. Tyre for vehicle wheels according to claim 27, wherein the elastomeric polymer (a') is selected from: ethylene/propylene copolymers (EPR) or ethylene/propylene/diene copolymers (EPDM); polyisobutene; butyl rubbers; halobutyl rubbers; or mixtures thereof.
29. Tyre for vehicle wheels according to any one of claim 14 to 28, wherein the elastomeric material comprises at least one carbon black filler (c).
30. Tyre for vehicle wheels according to claim 29, wherein the carbon black filler (c) has a surface area of not less than 20 m^2/g (determined by CTAB absorption as described in Standard ISO 6810:1995).
31. Tyre for vehicle wheels according to claim 29 or 30, wherein the carbon black filler (c) is present in the elastomeric material in an amount of from 0.1 phr to 120 phr.
32. Tyre for vehicle wheels according to claim 31, wherein the carbon black filler (c) is present in the elastomeric material in an amount of from 20 phr to 90 phr.
33. Tyre for vehicle wheels according to any one of claims 14 to 32, wherein the elastomeric material comprises at least one silane coupling agent (d).
34. Tyre for vehicle wheels according to claim 33, wherein the silane coupling agent (d) is selected from those having at least one hydrolizable silane group which may be identified by the following general formula (II):

$$(R)_3Si\text{-}C_nH_{2n}\text{-}X \quad (II)$$

wherein the groups R, which may be identical or different, are selected from: alkyl, alkoxy or aryloxy groups or from halogen atoms, on condition that at least one of the groups R is an alkoxy or

aryloxy group; n is an integer between 1 and 6 inclusive; X is a group selected from: nitroso, mercapto, amino, epoxide, vinyl, imide, chloro, $-(S)_mC_nH_{2n}-Si-(R)_3$ or -S-COR in which m and n are integers between 1 and 6 inclusive and the groups R are defined as above.

35. Tyre for vehicle wheels according to claim 33 or 34, wherein the silane coupling agent (d) is present in the elastomeric material in an amount of from 0.01 phr to 10 phr.

36. Tyre for vehicle wheels according to claim 35, wherein the silane coupling agent (d) is present in the elastomeric material in an amount of from 0.5 phr to 5 phr.

37. Tyre for vehicle wheels according to any one of claims 14 to 36, wherein at least one additional reinforcing filler is present, in an amount of from 0.1 phr to 120 phr, in the elastomeric material.

38. Tyre for vehicle wheels according to claim 37, wherein the reinforcing filler is silica.

39. Tyre for vehicle wheels according to claim 37, wherein at least one silane coupling agent (d) is present.

40. Tyre for vehicle wheels according to any one of the preceding claims, wherein the tread band is formed by a crosslinked elastomeric material having a dynamic elastic modulus, measured at 23°C, of from 5 MPa to 25 MPa.

41. Tyre for vehicle wheels according to claim 40, wherein the tread band is formed by a crosslinked elastomeric material having a dynamic elastic modulus, measured at 23°C, of from 7 MPa to 20 MPa.

42. Tyre for vehicle wheels according to any one of the preceding claims, wherein the tread band is formed by a crosslinked elastomeric material having a dynamic elastic modulus, mesured at 100°C, of from

3 MPa to 10 MPa.

43. Tyre for vehicle wheels according to claim 42, wherein the tread band is formed by a crosslinked elastomeric material having a dynamic elastic modulus, measured at 100°C, of from 3.5 MPa to 8 MPa.

44. Tyre for vehicle wheels according to any one of the preceding claims, wherein the tread band is formed by a crosslinked elastomeric material having a Tan delta, measured at 23°C, of from 0.20 to 0.90.

45. Tyre for vehicle wheels according to claim 44, wherein the tread band is formed by a crosslinked elastomeric material having a Tan delta, measured at 23°C, of from 0.30 to 0.70.

46. Tyre for vehicle wheels according to any one of the preceding claims, wherein the tread band is formed by a crosslinked elastomeric material having a Tan delta, measured at 100°C, of from 0.10 to 0.35.

47. Tyre for vehicle wheels according to claim 46, wherein the tread band is formed by a crosslinked elastomeric material having a Tan delta, measured at 100°C, of from 0.15 to 0.30.

48. Tyre for vehicle wheels according to any one of the preceding claims, wherein the tread band is formed by a crosslinked elastomeric material having a IRHD hardness, measured at 23°C, of from 65 to 85.

49. Tyre for vehicle wheels according to claim 48, wherein the tread band is formed by a crosslinked elastomeric material having a IRHD hardness, measured at 23°C, of from 70 to 80.

50. Tyre for vehicle wheels according to any one of the preceding claims, wherein the tread band is formed by a crosslinked elastomeric material having a IRHD hardness, measured at 100°C, of from 45 to 75.

51. Tyre for vehicle wheels according to claim 50, wherein the tread band is formed by a crosslinked

elastomeric material having a IRHD hardness, measured at 100 °C, of from 55 to 66.